## Claims

1. Method for producing modified flours or modified powdery to grainy, especially finely grained, starch-containing products from a ground or comminuted raw material product, predominantly containing starch, such as starch or flours from grains or tubers, especially wheat, rye flour, corn flour, potato flour, tapioca flour, etc. their mixtures and the like, the method comprising the following steps:

a) mixing and wetting the at least one comminuted, starch-containing raw material product with water and/or water vapor and optionally further additives by moving the raw material product in a mixing chamber (17) of a preconditioner during a first residence time for mixing,

b) allowing the water and/or the water vapor to act on the at least one raw material product by moving the raw material product in an action chamber (18) of the preconditioner during a first residence time for action,

c) extruding the mixture of water and raw material product, preconditioned in the mixing chamber and the action chamber in the steps a) and b), the temperature, the pressure, the water content, the mechanical energy introduced and the residence time of the mixture in the extruder (21) being

adjusted so that an at least partial plasticization and/or gelatinization of the raw material product to a conveyable mixture, containing a modified starch, takes place and

d) pelletizing (21a) the conveyable mixture and dry grinding the pellets to a predominantly powdery to grainy intermediate product (1), containing modified starch,

characterized in that the powdery to grainy intermediate product (1), obtained by palletizing in step d), is agglomerated (2, 3) by

e) mixing and wetting the powdery to grainy intermediate product (1), obtained in step d), with a fluid as well as optionally other additives by moving the intermediate product in a mixing chamber (57) of an agglomerator during a second mixing residence time for mixing and

f) letting the fluid act on the powdery to grainy intermediate product (1) by moving the intermediate product in an action chamber (58) of the agglomerator during a second residence time for action, so that agglomerates (2, 3) are formed from the particles (1) of the intermediate, containing the modified starch.

2. The method of claim 1, characterized in that, on the one hand, the preconditioner, in which steps a) and b) are carried out and, on the other, the agglomerator, in which steps e) and f) are carried out, each have a mixing chamber above an action chamber, which are connected with one another, each chamber having a rotor shaft, which extends along the respective chamber and is provided all around with tools.

3. The method of one of the claims 1 to 2, characterized in that the preconditioner and the agglomerator have the same construction.

4. The method of one of the claims 1 to 3, characterized in that the residence time of the product in the mixing chamber during step e) is about 0.2 to 5 seconds and preferably 0.3 to 2 seconds.

5. The method of one of the claims 1 to 4, characterized in that the residence time of the product in the action chamber during step f) is about 10 seconds to 15 minutes and preferably 15 seconds to 60 seconds.

6. The method of one of the claims 1 to 5, characterized in that the mixing chamber is filled to the extent of about 1 to 5%.

7. The method of one of the claims 1 to 6, characterized in that the action chamber is filled to the extent of about 25 to 75%.

8. The method of one of the claims 4 to 7, characterized in that the pressure in the mixing chamber and the action chamber is atmospheric pressure and the temperature of the chambers in each case is between ambient temperature and about 98°C.

9. The method of one of the claims 1 to 8, characterized in that a combination of several fluids, which are contained in the group comprising water, water vapor, sugar solutions and edible oil, is or will be metered in to wet the powdery to grainy product.

10. The method of claim 9, characterized in that the fluid or fluids is/are or will be atomized when metered in.

11. The method of one of the claims 1 to 10 characterized in that the agglomerates, obtained in step f), are classified according to size.

12. The method of claim 11, characterized in that the classification takes place in a sifter.

13. The method of claims 11 or 12, characterized in that the fraction of the agglomerates, which exceed a specified maximum agglomerate size, initially is supplied to a comminuting device, such as an impact mill, and subsequently, optionally together with the product obtained in step d), once again is supplied to the agglomerator.

14. The method of one of the claims 11 to 13, characterized in that the fraction of the agglomerates, which are smaller than a specified minimum agglomerate size, optionally together with the product obtained in step d), once again is supplied to the agglomerator.

15. The method of claims 13 or 14, characterized in that the fraction of the agglomerates, which are smaller than the maximum agglomerates size and/or larger than the minimum agglomerates size, is collected as end product.

16. The method of one of the claims 1 to 15, characterized in that it is carried out continuously during and between the steps a) to f).

17. The method of one of the claims 1 to 16, characterized in that further additives, such as flavors, spices, coloring materials, emulsifiers, acids and the like, are metered in during at least one of the steps a) to f).

18. The method of one of the preceding claims, characterized in that the intermediate product in the mixing chamber is moved by means of a shaft, which rotates about its longitudinal axis and has radially protruding conveying elements.

19. The method of one of the preceding claims, characterized in that the intermediate product in the action chamber is moved by means of a shaft, which rotates about its longitudinal axis and has radially protruding conveying elements.

20. The method of claims 18 or 19, characterized in that the shaft of the mixing chamber is driven at a rate of about 50 rpm to 900 rpm and especially of about 700 rpm.

21. The method of one of the claims 18 to 19, characterized in that the shaft of the action chamber is driven at a rate of about 5 rpm to 30 rpm.

22. The method of one of the claims 18 to 21, characterized in that the mixing chamber essentially has the shape of a horizontal cylinder, the axis of rotation of the shaft extending along the axis of the cylinder.

23. The method of one of the claims 18 to 22, characterized in that the action chamber essentially is in the shape of a horizontal cylinder, the axis of rotation of the shaft extending along the axis of the cylinder.

24. The method of one of the claims 18 to 23, characterized in that the capacity of the action chamber is about 1.5 times to 10 times and especially about twice to five times that of the mixing chamber.

25. The method of one of the preceding claims, characterized in that the fluid, used in step e) for wetting the intermediate product and in step f) for acting on the intermediate product, contains at least water vapor and/or water.

26. Installation for producing modified flours or modified, powdery to grainy, especially finally grained, starch-containing products from a ground or comminuted raw material product, predominantly containing starch, using the method of one of the claims 1 to 25, the installation having the following parts or machines:

- a preconditioner (17, 18) with a mixing chamber (17) for mixing and wetting the at least one comminuted, starch-containing raw material product with water and/or water vapor as well as optionally further additives and an action chamber (18) for permitting the water and/or water vapor to act on the at least one raw material product,

- an extruder (21) for extruding the preconditioned mixture, containing water and the raw material product and emerging from the mixing chamber (17) and the action chamber (18), the extruder (21) having a pelletizing device (21a) for pelletizing the mixture emerging from the extruder,

- a mill (34) for grinding the pellets dry into a powdery to grainy intermediate product and

- an agglomerator (57, 58) for agglomerating the powdery to grainy intermediate product,

- characterized in that the agglomerator (57, 58) has:

- a mixing chamber (57) for mixing and wetting the powdery to grainy intermediate product, obtained in the mill, with a fluid as well as optionally further additives, and an action chamber (58) for allowing the fluid to action the powdery to grainy intermediate product.

27. The installation of claim 26, characterized in that the preconditioner (17, 18) and/or the agglomerator (57, 58) each have a mixing chamber (17; 18) above an action chamber (18; 58), which are connected with one another, each chamber having a rotor shaft, which extends along the respective chamber and is provided with tools around the shaft.

28. The installation of claims 26 or 27, characterized in that the precondition (17, 18) has the same construction as the agglomerator (57, 58).

29. The installation of one of the claims 26 to 28, characterized in that the mixing chamber (17, 57) essentially has the shape of a horizontal cylinder, the axis of rotation of the shaft extending along the axis of the cylinder.

30. The installation of one of the claims 26 to 29, characterized in that the action chamber (18; 58) essentially has the shape of a horizontal cylinder, the axis of rotation of the shaft extending along the axis of the cylinder.

31. Modified flour, which consists of agglomerates, which are produced from a ground or comminuted, predominantly starch-containing raw material product, such as starch or flour from grain or tubers, especially wheat, rye flour, corn flour, potato flour, tapioca flour, etc. or their mixtures and the like, according to the method of one of the claims 1 to 25.

32. The modified flour of claim 31, characterized in that the agglomerates may range in size essentially from about 200 μm to 5 mm and particularly from 500 μm to 2 mm.